

SOAP DISPENSING CLEANING DEVICE

The present invention relates to cleaning devices and, in particular, to such devices which carry and dispense cleaning fluid. The invention relates in particular to a soap-dispensing brush.

BACKGROUND OF THE INVENTION

Prior soap-dispensing cleaning devices are known, which include a housing defining a soap-containing reservoir, with a wall of the housing carrying a cleaning medium, such as a sponge, brush or the like. A valve assembly dispenses fluid from the reservoir to the cleaning medium. In one such device the valve assembly includes a stem which extends upwardly through an opening in a cap which closes the upper end of the reservoir. While such devices are able to dispense soap to the cleaning medium, they are either expensive and complex to manufacture or have valve actuating mechanisms that operate inefficiently. Such devices may also have a flexible pump button in order to activate the valve. However, a depressed pump button may remain in a deflected position, causing the apparatus to be inoperable.

SUMMARY OF THE INVENTION

It is a general object of the invention to provide an improved fluid-containing cleaning device which avoids the disadvantages of prior such devices while affording additional structural and operating advantages.

An important feature of the invention is the provision of a fluid-containing cleaning device of the type set forth, which has a manually-actuated resilient button for actuating a fluid-dispensing valve assembly via increase of pressure within the reservoir by movement of the button between a rest position and a depressed position.

In connection with the foregoing feature, another feature of the invention is the provision of a device of the type set forth having a resilient button including a bias member for returning the button to a rest position.

Still another feature of the invention is the provision of a device of the type set forth, which is of simple and economical construction.

Certain ones of these and other features of the invention may be attained by providing a fluid-containing cleaning device comprising: an open housing defining a fluid reservoir, a cleaning medium carried by the housing, a valve carried by the housing for providing communication between the reservoir and the cleaning medium, a closure structure closing the opening, a flexible and resilient actuator deflectable between a rest position and an actuating position and a bias structure disposed adjacent to the actuating member so that upon depression of the actuating member, the bias structure will return the button to its rest position.

The invention consists of certain novel features and a combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the details may be made without departing from the spirit, or sacrificing any of the advantages of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For the purpose of facilitating an understanding of the invention, there is illustrated in the accompanying drawings a preferred embodiment thereof, from an inspection of which, when considered in connection with the following description, the invention, its construction and operation, and many of its advantages should be readily understood and appreciated.

FIG. 1 is a perspective view of a cleaning device in accordance with the present invention;

FIG. 2 is an enlarged view in vertical section of an embodiment the cleaning device of FIG. 1;

FIG. 3 is a reduced, exploded, perspective view of the cleaning device of FIG. 2;

FIG. 4 is a perspective view illustrating an interior of a button of the cleaning device of FIG. 1;

FIG. 5 is an enlarged view in vertical section of an alternate embodiment of the cleaning device of FIG. 1;

FIG. 6 is a perspective view illustrating an interior of a button of the cleaning device of FIG. 5;

FIG. 6a is a perspective view of an alternate embodiment of a button of the cleaning device of FIG. 5;

FIG. 7 is an exploded, perspective view of the cleaning device of FIG. 5;

FIG. 8 is an enlarged view in vertical section of a further alternate embodiment of the cleaning device of FIG. 1;

FIG. 9 is a reduced, exploded, perspective view of the cleaning device of FIG. 8;

FIG. 10 is a perspective view illustrating an interior of a button of the cleaning device of FIG. 8;

FIG. 11 is a perspective view of a bias member of the cleaning device of FIG. 8; and

FIG. 12 is a top plan view of a bias member of the cleaning device of Fig. 8.

DETAILED DESCRIPTION

Referring to FIGS. 1-12, there is illustrated a fluid-containing cleaning device, generally designated by the numeral 10, constructed in accordance with and embodying the features of the present invention. The cleaning device 10 is in the nature of a liquid soap-fillable brush, but it will be appreciated that the present invention is applicable to cleaning devices with other types of cleaning media, such as sponges, pads or the like. FIG. 1 depicts the general features of the cleaning device and FIGS. 2-12 depict alternate embodiments thereof. Like numerals will be used in all of the FIGS., to designate like elements.

The cleaning device 10 has a housing 11 which includes a generally cylindrical side wall 12, in an embodiment formed of a transparent or translucent material, such as a suitable polymer. In an embodiment, the side wall 12 forms a top opening 9 and the wall 12 has a radially inwardly projecting circumferential depression 13 formed therein intermediate the upper and lower ends thereof, which can serve as a finger grip to facilitate grasping of the device by a user's hand. The side wall 12 is provided at its upper end with an annular shoulder and an upwardly projecting cylindrical collar 15.

In an embodiment, the collar 15 is externally threaded and includes a spiral thread 16. In an alternate embodiment other coupling means may be provided, for example, short rectangular lugs may project radially outwardly from the upper end of collar 15 at equiangularly spaced locations. An annular groove 17 is formed in the lower end of the side wall 12 and is adapted to receive therein a cylindrical flange 19 projecting axially from the annular end face 18 of a base 20, which may be formed of a suitable polymer material. The base 20 is fixedly secured to the side wall 12 for closing the lower end thereof by any suitable means, such as by ultrasonic welding. In an embodiment, an energy director in the form of an annular ridge 21 may protrude from the annular flange 19 to facilitate ultrasonic welding. In an alternate embodiment, the base 20 may be removably attached to the housing 11 by known coupling means, such as threaded coupling, bayonet coupling, friction fit, snap fit or via fasteners.

The base 20 has an axial bore 24 formed therethrough which is provided with a frustoconical inner portion at its upper end wall. Fixedly secured to the outer surface of the base 20 is a suitable cleaning medium 25 which, in the illustrated embodiment, comprises a plurality of brush bristles (FIG. 1), which may be fixed in sockets in the base 20 by any suitable means. It will be appreciated that the axial bore 24 provides communication between a reservoir formed in an interior of the housing 11 and the cleaning medium 25. Mounted in the bore 24 is a valve assembly including a retaining ring 26 that receives a valve 28 therein. In an embodiment, the valve assembly may operate as described in any of U.S. Patent Nos. 5,439,143; 5,409,144; 5,377,877; 5,339,995; 5,213,236; 5,033,655 or 4,991,745, each of which is incorporated herein by reference.

The device 10 includes a closure structure 40 including a cap 45 disposed therein. In an embodiment, the cap 45 is rigid and is generally part-dome-shaped and includes a generally cylindrical skirt portion 46. In an embodiment, the skirt portion 45 is internally threaded and includes generally spiral thread 47 in its inner surface in order to correspond to the thread 16 of the housing 11. In an alternate embodiment, other coupling means may be provided, such as a friction fit, bayonet lock or snap lock. The cap 45 defines an opening 48, 49 therein.

There is also provided a flexible and resilient member 51. In an embodiment, the resilient member 51 covers the entire outer surface of the cap 45 and includes an actuator or button 50 that spans and closes the opening 48, 49. In an embodiment, the closure structure 40 includes the button 50 formed thereon. In an alternate embodiment, the button 50 may be formed separate from the closure structure 40 and the cap 45. In an embodiment, the resilient member 51 is formed of a suitable elastomeric material and is fixedly secured to the outer surface of the cap 45 by any suitable means, such as insert molding. In an embodiment, the button 50 is preferably integrally molded with the resilient member 51. In an embodiment, a circular groove 53 is formed between the button 50 and the remainder of the resilient member 51 to facilitate flexing of the button 50. In an embodiment, it can be seen that the button 50 completely encloses the opening 48, 49, thereby effectively preventing the escape of fluid through the opening 48, 49. Furthermore, the button 50 and resilient member 51 which may be formed of an elastomeric material, such as that sold under the trademark "SANTOPRENE", also provides a frictional non-slip surface to improve the grip by a user's hand. In an embodiment, the button 50 is oriented at the pole or vertex of the resilient member 51. In an embodiment, the button 50 is convex. In alternate embodiments, the button may be flat or concave.

In use, the cap 45 is fitted onto the upper end of the housing 11, with the thread 16 threadedly engaging the thread 47. Upon rotation of the cap 45, relative to the side wall 12, the closure structure 40 is securely held in place for cooperation with the housing 11 to define and close a fluid reservoir 55, which is fillable with a suitable cleaning fluid, such as a liquid soap. It will be appreciated that the cap 45 could also be removably attached to the housing 11 by other means. The flexible and resilient nature of the button 51 of the resilient member 50 accommodates easy manual actuation of the actuator button 51 from above the cap 45. When the cap 45 is secured in place, the threaded skirt 46 forms a fluid-tight seal between the cap 45 and the housing 11. It is also appreciated that in an alternate embodiment, the cap 45 and member 50 may be formed of one-piece to provide an integral resilient and flexible closure structure 40.

Turning to the alternate embodiments disclosed by FIGS. 2-14, 5-7 and 8-12, each of the alternate embodiments function similarly and have the same components as discussed above except for a bias assembly which will now be described for each of the embodiments. Turning to FIGS. 2-4, a bias assembly 60 is depicted, which includes a bias structure 61 and a retaining plate 62. In an embodiment, the bias structure 61 may be a coil spring. In an embodiment, the coil spring may be formed of metal, polymer or other suitable material. In an embodiment, the retaining plate 62 is cylindrical in shape and includes a flange 63, a body 64 and a support member 65 attached to the body 64. The body 64 defines a cylindrical opening 66 which receives the bias structure 61 therein. In an embodiment, the support member 65 has support arms 67a, b, c, d extending from a center panel 68. In an embodiment, a cylindrical cup 69 is disposed on the panel 68. In an embodiment, a knob 71 protrudes from the panel 68 and is surrounded by the cylindrical cup 69 to form a channel 72 therein. The cylindrical channel 72 receives an end of the bias structure 61 so that the coils of the bias member are securely mounted

so that the end of the bias structure 61 is restricted from lateral movement. In an embodiment, the diameter of the knob 71 is approximately equal to the inner diameter of the coils of the bias structure 61.

The button 50 includes an interior wall 75. In an embodiment, a collar 76 protrudes from the interior wall 75. In an embodiment, the collar may be integrally formed with the resilient member 51. In an embodiment, the collar 76 has an outer diameter that is approximately equal to the inner diameter of the coil spring of the bias structure 61 and receives the coil spring thereon. Therefore, as shown in FIG. 2, it may be understood that a first end of the coil spring is mounted to the knob 71 and received in the channel 72 and a second end of the bias structure 61 is mounted onto the collar 76 of the button 50. By trapping the bias member 61 between the interior wall 75 and the retaining plate 62, the bias member is securely held in place and will provide a strong bias force in order to return the button 50 to its rest position (as shown in FIGS. 2 and 3) after being depressed in order to pressurize the reservoir 55. Therefore, it is understood that a user may manually deflect the button 50 by pushing downward, which will compress the bias member 61. Moving the button 50 to a depressed or actuating position will increase the pressure within the reservoir 55 causing the fluid contained therein to push against the valve 28 and to open the valve and dispense the fluid therethrough. After the user's finger is removed from the button 50, the bias structure 61 will bias against the interior wall 75 and return the button 50 to its rest position.

In an embodiment, the retaining plate 62 includes a coupling means such as holes 77 formed in the rim 63 for receiving pegs 78 therethrough. The pegs 78 protrude from the cap 45, in an embodiment. In an embodiment, four pegs 78 and four holes 77 are provided on the

retaining plate 62 in order to prevent rotation of the retaining plate within the closure structure 40. In an alternate embodiment, other means of mounting or coupling the retaining plate 62 may be provided. For example, a rim or annular flange may be provided by the housing 11 at the opening 9 for attachment to or mounting of the retaining plate 62 thereto.

Turning to FIGS. 5-7, an alternate embodiment of the cleaning device of FIG. 1 will be described. As discussed above, the alternate embodiment of the cleaning device 10a includes like elements that were discussed above which have like numerals marked in FIGS. 5-7. In the alternate embodiment, a bias member 80 is provided which is disposed within the button 50. In an embodiment, the bias member 80 protrudes from an interior wall 75 formed of the button 50. In an embodiment, the bias member 80 may be integrally molded with the button 50 of a resilient and flexible material such as an elastomer. In an embodiment, the bias member 80 includes a nipple 81 that protrudes perpendicularly from the interior wall 75. Extending from the nipple 81 are arms 82a, 82b, 82c and 82d. In an embodiment, the arms may form a cross-shape bias member. The arms 82a, 82b, 82c, 82d may be attached to the interior surface 75 adjacent the nipple 81 and separated at each terminal end from the interior wall 75. The arms are deflectable and allow the dome of the button 50 to be depressed, but provide a bias in order to return the button 50 to its rest position as shown in FIG. 5. In an embodiment, the arms 82a, 82b, 82c and 82d and nipple 81 are integrally molded on the interior surface 75 of the button 50. In an embodiment, the bias member 80 may be integrally molded with the button 50 of a polymer material such as Tresfin.

In an embodiment, each arm 82a extends from the side of the nipple 81 and bilaterally sections the interior surface 75 of the button 50. In an embodiment, each arm is generally

triangular shaped and generally forms an isosceles triangle having a vertex that, in an embodiment, is generally less than 30 degrees. In an embodiment, the base of the triangular arm 82a is approximately 5.3 mm and the width of the arm is approximately 1.5 mm. By forming the arms 82a, 82b, 82c and 82d with such geometry, they can deflect inward and are able to return the button 50 to its rest position.

In an alternate embodiment, the bias member may be formed as depicted in Fig. 6a. The bias member 80a is provided by features formed in the interior wall 75a of the button 50. In an embodiment, the features include blade shaped elevated areas 84a, b, c. In an embodiment, three elevated areas 84a, b, c are provided on the interior 75a. For example, each blade shaped area 84a, b, c provides recessed gaps 85a, b, c, formed between each blade 84a, b, c. In an embodiment, a nipple 86 is formed at the center of the blades 84a, b, c. Such a construction allows for the blade areas 84a, b, c, to provide sufficient bias force to return the button 50 to a rest position. In an embodiment, the button 50 includes a closure structure 40 having a cap 45 including a threaded skirt 46.

Turning to FIGS. 8-12, an alternate embodiment of the cleaning device of FIG. 1 will be described. In this alternate embodiment of cleaning device 10b, a retaining plate 62 is provided which is constructed similarly to the retaining plate discussed above with respect to FIGS. 2-4. Like numerals for like elements for the retaining plate and other elements will be provided in FIGS. 8 and 9 and the particular construction of the retaining plate 62 will not be described in further detail in this section. While the support member 65 is provided in the retaining plate 62 of both embodiments, the support member 65a of the retaining ring 62 depicted in FIG. 9 includes an open aperture 90 formed therein having an annular rim 91.

In this alternate embodiment a bias member 93 is provided having a cone-shaped spring having generally spiral walls 94 extending from an annular base 95 having an offset collar 96 extending therefrom. The apex of the bias member cone includes a nipple 97 which extends from a neck 98. The spiral walls 94 allow for the bias member 93 to have a spring action where the wall elements 94 may compress into gaps 99 so that the overall height of the cone bias member 93 is reduced and the neck 98 may be moved generally co-planer with the base 95. In an embodiment, the height of the cone of the bias member 93 from its base 95 to the tip of the nipple 97 is approximately 19.7 mm and the diameter of the base 95 is 23.0 mm. Such a geometry allows for the bias member 93 to provide sufficient bias force to return the button 51 to its rest position after being depressed and following compression of the bias member 93.

The bias member 93 is mounted within the retaining plate 62 so that the collar 96 is received within the rim 91 of the support member 65. In an embodiment, the outer diameter of the collar 96 is approximately equal to the inner diameter of the rim 91 so that a snug friction fit is provided when the bias member 93 is mounted to the retaining plate 62. In an embodiment, the nipple 97 is received within a collar 76 protruding from the interior wall 75 of the button 51 (see FIG. 8). In an alternate embodiment, the bias member 93 may be molded integrally with the retaining plate 62.

In assembly of the device 10b, the bias member 93 is mounted to the retaining plate 62. The retaining plate is then mounted within the button 50, so that the holes 77 of the rim 63 of the retaining plate 62 are aligned with the pegs 78 protruding down from the interior surface of the button 50. In an embodiment, the retaining plate 62 may be secured to the button 51. For example, welding or heat staking may be used to secure the retaining plate 62 in place within the

button 50. Therefore, it is understood that the bias member 93 is trapped between the interior wall 75 of the button 50 and the retaining plate 62. The closure structure 40 is then coupled to the housing 11. In an embodiment, the closure structure 40 is threadedly coupled to the housing 11. Other known coupling means may be provided. The valve 28 is then mounted to retaining ring 26 and the retaining ring then mounted in aperture 24 of the base 20. The base is then coupled to the housing 11. In an embodiment, the base may be welded to annular groove 17. In an alternate embodiment, the base 20 may be removably secured thereto.

In an embodiment, the orientation of these components may provide for precise volumes of fluid, such as clumps of liquid soap to be dispensed by the apparatus. By altering the orientation of these components, the apparatus may be constructed to be customized for specific applications or cleaning jobs that require a specified amount of fluid to be dispensed. For example, an apparatus that has a base having bristles may be used for heavy duty scrubbing and may require extra large volumes of soap to be dispensed. For such an application, a high-volume orientation of the fluid dispensing components may be provided. In such an embodiment, for example, the resilient member 51 may be formed having a large surface area and large resilient dome portion or button 50, the reservoir 55 may have a large volume and the valve assembly 26, 28 may provide for a large diameter bore and be constructed to deflect easily. Any one, or all of these component orientations and sizes may be adjusted to fine-tune the volume dispensing capabilities of the apparatus. In a further alternate example, a low volume fluid dispensing orientation may be provided for an apparatus that may be used for light cleaning tasks. In such an embodiment, a closure structure 40 having a smaller surface area and smaller button 51, a smaller volume reservoir 55 and a valve assembly 26, 28 having a smaller bore and restrained deflection may be provided in the construction of the apparatus.

From the foregoing, it can be seen that there has been provided an improved fluid-containing cleaning device which is refillable with and easily dispenses a suitable cleaning fluid.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects. Therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only and not as a limitation. The actual scope of the invention is intended to be defined in the following claims when viewed in their proper perspective based on the prior art.